2659

MONTHLY TECHNICAL PROGRESS REPORTS JULY 1988

07/01/88

75
ENCLOSURE

REMEDIAL INVESTIGATION

AND

FEASIBILITY STUDY

MONTHLY TECHNICAL PROGRESS REPORTS

July 1988

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO

FMPC SITEWIDE RI/FS
July 1988
MONTHLY TECHNICAL PROGRESS REPORT

STATUS

General

Progressive actions continued on the FMPC sitewide RI/FS during July, 1988. The off-site drilling program continued with the installation of three wells and a total drilling footage of 376.5 feet.

The second quarterly groundwater sampling program was initiated in early July. Forty-three of 168 wells were sampled during the month.

Verification of the code for the Swift III model was completed during July. Final calibration of the 2-dimensional flow model was also completed during the reporting period.

Task 1 - Description of Current Situation

Task 1 Percent Completed: 100%

Task 2 - Remedial Investigation Work Plan Requirements

Draft addendums to the RI/FS Work Plan Revision 3 for the Facilities Testing Program and the installation of three additional off-site wells were completed during the month. Two of the additional wells are being installed at the request of OEPA to investigate potential particulate deposition in the prevailing wind direction across the FMPC. The third well is being installed as a replacement for an existing off-site monitoring well which was removed from the RI/FS program at the request of the property owner. The two draft addendums are currently undergoing internal review and are anticipated to be issued in August.

Task 2 Percent Completed: 95%

Task 3 - Site Investigation

Groundwater and Subsurface Soils - Drilling was completed at off-site monitoring well locations 395, 295, and 496 during July. Two additional off-site wells were under construction as of July 30, 1988. A summary of the wells installed during July and their completed casing depths appears in Table 1.

TABLE 1

WELL COMPLETIONS

RI/FS WELL LOCATION	DATE COMPLETED	COMPLETION DEPTH (ft)
395	07-12-88	82.4
295	07-14-88	27.0
496	07-26-88	190.0
396	In Progress	
497	In Progress	

The three wells installed during July were completed in a manner consistent with the protocols defined within the Work Plan Revision 3 and supporting documentation. As of July 30, 1988, twelve of the 19 proposed off-site RI/FS monitoring wells were completed. Completion of the well drilling program is anticipated for the third week of August.

Results of the first round of water quality sampling are currently being compiled. As of June 30, 1988, all radiological and chemical data had been received with the exception of the inorganics analyses from those wells sampled for the Hazardous Substances List (HSL). The results of the inorganic analyses is anticipated to be completed by August 15, 1988. Preliminary maps depicting water levels, round one total uranium concentrations, and till thicknesses on the FMPC are provided as an attachment to this progress report. Final maps are anticipated to be available for inclusion in the August RI/FS Technical Progress Report.

The second round of the quarterly groundwater sampling program was initiated in early July. As of July 30, forty-three of 168 wells were sampled. Completion of the second round of water quality sampling is anticipated for the fourth week of August.

Monitoring well 252 - After repeated surveillances of water levels in monitoring well 252, it was determined that the completion depth was too shallow to properly monitor the saturated zone. As a result the stainless steel casing and screen was removed and the well deepened by 16.5 feet. The well was reinstalled in a manner consistent with the protocols defined within the RI/FS Work Plan Revision 3.

Transit Survey - Surveying activities continued on establishing the horizontal and vertical coordinates of the off-site wells within the RI/FS groundwater monitoring program.

Radiation Measurement Program - The surface radiological survey to support the RI/FS was completed during June, 1988. Data from these surveys are being analyzed to establish a correlation formula for comparing count per minute data from the various field instruments and activity concentrations of uranium in soil. This formula will be used to determine the locations for collecting the remaining biased soil samples.

Surface Soil Sampling - There was no additional soil sampling during July. Soil sampling will resume in August after the surface radiological survey data has been analyzed and the exact sampling locations have been established.

Zone of Influence Sampling - In support of the Zone of Influence (ZOI) study being conducted in response to Order 14 of the Ohio Directors Findings and Orders, surface water samples were collected in the Big Bend Area of the Great Miami River. Eleven locations were sampled in this area, and a total of 41 water samples were collected. All of the samples were collected in one working day and filtered in the field. The collected samples were transferred to the IT Radiological Sciences Laboratory for full radiological analyses.

Great Miami River Sampling - Quarterly surface water samples were collected from seven locations in the Great Miami River. These locations are positioned along the river from the Ross Bridge to several kilometers south of the FMPC discharge line. Sediment samples were also collected from the Great Miami River in the same reach as the surface water samples. The surface water samples were submitted to the laboratory for full radiological and general water quality analyses. The sediment samples were submitted for full radiological and HSL analyses. Analytical results on these samples are anticipated to be received by the end of August.

FMPC Drainage Surface Water and Sediment Sampling - No surface water drainage or seep sampling was performed during July due to the drought conditions prevailing in the southwestern Ohio area. On July 7 and 8, sediment samples were collected at 22 locations on FMPC drainages as outlined in the RI/FS Work Plan Revision 3. Collected sediment samples were transferred to the laboratory for full radiological analyses.

Biological Resources - The survey for the cave salamander has been placed on hold pending a more favorable weather pattern. The cave salamander is recognized as an Ohio endangered species and is known to occur in the vicinity of the FMPC. The cave salamander has not as yet been identified on FMPC property. The survey for the Indiana Bat continued during July. The Indiana Bat is recognized as a federally endangered species and is known to occur in Butler and Hamilton counties in Ohio. The Indiana Bat has not as yet been identified on FMPC property.

Former Drum Baling and Trench Area - There was no significant activity associated with the investigation of the former drum baling and trench area during July. Final analytical data for the HSL samples collected during the investigation are anticipated to be received during August.

Task 3 percent complete: 80%

Task 4 - Site Investigation Analysis

Data Base - Initial programming was completed for sorting lab sample results and for reducing surface radiological data. Initial QA checks were completed for groundwater monitoring data currently entered in the system.

Groundwater Modeling - Verification of the Swift III model code was completed during July. Final calibration of the two-dimensional flow model was also completed during July.

Task 4 Percent Complete: 45%

Tasks 5 and 6

No significant activity during the reporting period.

Tasks 5 and 6 Percent Complete: 0%

Task 7 - Program Management and Reports

A revised Project Management Plan was drafted for review. The Project Management Plan is an internal control document relating to subcontract budgetary and schedule considerations.

Task 7 Percent Complete: Not Applicable (apportioned effort).

Task 8 - Community Relations Support

No significant activities during the reporting period.

Task 8 Percent Complete: Not applicable (apportioned effort).

Attachment 1 to this report provides the lithologic and well completion logs for monitoring wells 295, 395, and 496. Attachment 2 to this report provides preliminary maps of water levels, total uranium concentrations in groundwater, and till thicknesses across the FMPC.

PLANNED ACTIVITIES FOR NEXT MONTH

- Submit Facilities Testing Addendum to the RI/FS Work Plan Revision 3.
- Submit addendum to the RI/FS Work Plan Revision 3 for three additional off-site wells.

ATTACHMENT I

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1002 03 02	PROJECT NAME: FMPC	
BORING NUMBER: B 395	COORDINATES:	DATE: 7-7-88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-7-88
ENGINEER/GEOLOGIST: SCHWARTZ	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 1 OF 7

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 (6in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	7/7 OBCO 10173	7 19 21	12	soft dark brown topsoil (10YR) / hard yellow brown sandy silt (10YR 4/4) dry	ml	<1 / >5	HNu = 0 ppm; γβ = 40 cpm; α = 0 cpm
2	7/7 10174	15 25 50	12	Dense brown yellow silty sand, some gravel (2.5YR 7/6) dry	sm	NA	HNu = 0 ppm; γβ = 40 cpm; α =
3 4	7/7 10035	50 46 50	6	dense brown yellow (2.5YR 7/6) silty sand, some gravel, well graded, dry	sm	NA	HNu = 0 ppm; γβ = 40 cpm; α = 0 cpm
5 6 7 8 9							
10 11	7/7 10036	20 31 40	12	dense yellow brown sand, some gravel, well graded (10YR 5/6) moist	sw	NA	HNu = 0 ppm; γβ = 40 cpm; α = 0 cpm
12 13 14							

NOTES: Drilling contractor: Penn Drill
Drill Rig : Speedstar
Driller : Harry Dykes
Helper : Tim Harris
Geologist : Mike Schwartz

background : HNu = 0 ppm
γβ = 40 cpm
α = 0 cpm

9

blows counted on standard splitspoon
Munsell color Chart used

402-11-86

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 0302	PROJECT NAME: FMPC	
BORING NUMBER: B 345	COORDINATES:	DATE: 7-7-88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-7-88
ENGINEER/GEOLOGIST: SCHWARTZ	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 2 OF 2

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	7/7 1440 10037	90	6	very dense yellow brown (10YR 5/4) fine to med. sand, some clay inclusions, poorly graded moist	SW	NA	HNU = 0ppm βγ = 40cpm α = 0cpm
16							
17							
18							
19							
20	7-7 1545 10038	24 13 18	9	med. dense wellgraded med to coarse yellow brown (10YR 4/3) sand, tr. gravel wet	SW	NA	HNU = 0ppm βγ = 40cpm α = 0cpm
21							
22							
23							
24							
25	10039	22 28 35	15	med. dense to dense, wellgraded med. to coarse yellow brown (10YR 4/3) sand, tr. gravel, wet	SW	NA	HNU = 0ppm βγ = 40cpm α = 0cpm
26							
27							
28							
29							

NOTES:

background: HNU = 0 ppm
βγ = 40 cpm
α = 0 cpm

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6023.2	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: B 395	COORDINATES:		DATE: July 8, 1988
ELEVATION:	GWL: Depth — Date/Time —		DATE STARTED: July 7, 1988
ENGINEER/GEOLOGIST: L. Wille / M. Schmidt	Depth Date/Time		DATE COMPLETED:
DRILLING METHODS: Cable Tool			PAGE 3 OF 7

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (½ FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	7-8 @840 10040	12 11 11	14	medium dense brown 10YR 5/3 sand and gravel some silt and clay, moderately sorted, rounded - wet	gm	NA	HNu = 0ppm γB = 40cpm α = 0 cpm
32							
33							
34							
35							
36	7-8 1030 10041	18 29 38	18	very dense ~~brownish~~ grayish brown 10YR 5/2 sand, some silt and clay trace gravel, and pebbles - wet	gm	NA	HNu = 0ppm γB = 20cpm α = 0 cpm
37							
38							
39							
40							
41	7-8 1100 10042	2 7 5	6	medium dense grayish brown 10YR 5/2 sand and gravel some silt clay and pebbles poorly sorted - wet	gm	NA	HNu = 0 ppm γB = 30cpm α = 0 cpm
42							
43							
44							

NOTES:

background: HNu = 0ppm
γB = 20-40cpm
α = 0cpm

11

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: Fernald RI/FS	PROJECT NAME: Fernald RI/FS 602.3.2	
BORING NUMBER: K 395	COORDINATES:	DATE: July 8, 1988
ELEVATION:	GWL: Depth — Date/Time	DATE STARTED: July 7, 1988
ENGINEER/GEOLOGIST: L. Wille/Mike Schaile	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 4 OF 7

DEPTH (Ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (½ FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	7-8 1340 10043	11 24 18	18	dense brown 10YR 5/3 sand and gravel some silt, clay and pebbles, poorly sorted wet	gm	NA	HNu = 0ppm γβ = 60cpm α : 0cpm
47							
48							
49							
50							
51	7-8 1435 10044	4 4 5	18	loose grey 7½YR 5/ fine to medium sand some silt, clay and coarse sand trace gravel - wet	gm	NA	HNu: 0ppm 2 tries to γβ = 60cpm get sample α = 0cpm
52							
53							
54							
55							
56	7-9 0825 10045	22 23 40	12	dense brown grey (10YR 4/2) coarse sand some gravel, well graded - wet	sc	NA	HNu = 0 ppm γβ = 40-60cpm α = 0cpm
57							
58							
59							

NOTES:

background: 7-9
HNu = 0 ppm
γβ = 40-60 cpm
α = 0cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6.02.3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 395	COORDINATES:	DATE: 2-9-88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-2-88
ENGINEER/GEOLOGIST: SCHWARTZ	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable tool		PAGE 5 OF 7

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61	2-9 1020 10046	6 7 9	12	loose to med. dense olive gray (5Y 4/2) gravelly sand, wet	GW	NA	HNu = 0ppm βγ = 60 cpm α = 0cpm
62							
63							
64							
65							
66	2-9 11:25 10047	22 24 29	15	dense dark gray brown (2Y 4/2) gravelly sand wet	GW	NA	HNu = 0 ppm βγ = 40-60cpm α = 0 cpm
67							
68							
69							
70							
71	2-9 1340 10048	17 22 25	12	med. dense grey fine to med. sand grading to med. to coarse near bottom (10YR 5/1) wet	SP	NA	HNu = 0 ppm 2 types βγ = 80-100cpm for sample α = 0 cpm
72							
73							
74							

NOTES:

background: HNu = 0 ppm
2-9 βγ = 80-100 cpm
α = 0cpm

count rose from 40-60 cpm in afternoon

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1001 05 01	PROJECT NAME: FMPC		
BORING NUMBER: 395	COORDINATES:		DATE: 7-9-88
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 07-07-88
ENGINEER/GEOLOGIST: SCHWARTZ	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable tool			PAGE 6 OF 7

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76	7-9 1520 10049	11 16 17	12	med. dense grey (10YR 5/1) med sand, poorly graded, wet	SP	NA	HNu = 0 ppm β = 80 max ppm α = 0 cpm
77							
78							
79							
80							
81	7-9 1530 10050	7 16 19	12	med. dense grey (10YR 4/1) sand, some gravel, poorly graded, wet	SP	NA	HNu = 0 ppm β = 80 max cpm α = 0 cpm
82							
83							
84							
85							
86	7-10 0925 10051	AR 36 39	12	dense grey (10YR 5/1) sand, tr gravel and clay, well graded, wet	SW	NA	HNu = 0 ppm β = 40 cpm α = 0 cpm
87							
88							
89							

NOTES:

background: 7-10 HNu = 0 ppm
β = 40-60 cpm
α = 0 cpm

14

402-11-86

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1007 0315	PROJECT NAME: FEMPC		
BORING NUMBER: 395	COORDINATES:		DATE: 7-10-88
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 7-7-88
ENGINEER/GEOLOGIST: SCHWARTZ	Depth	Date/Time	DATE COMPLETED: 7-10-88
DRILLING METHODS: Cable Tool			PAGE 7 OF 7

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
91	7-10 1155 10052	16 19 22	9	med. dense gray (10YR 5/1) sand, well graded, wet	SW	NA	HNu = 0 ppm BG = 40 cpm ∠ = 0 cpm
92				END OF BORING			
93							
94							
95							

NOTES:

Total of ≈600 gallons of water used, large amount due to blow sand

15

402-11-86

FERNALD
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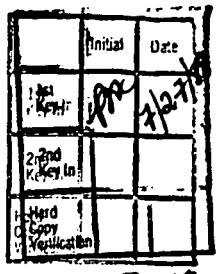
2659



PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC FIELD ENG./GEO. SCHWARTZ DATE 07-12-88
PRCJECT NC. 6002 03 02 CHECKED BY _____ DATE _____
BORING NO. B 395
PIEZOMETER NO. 395 DATE OF INSTALLATION 07-12-88

BOREHOLE DRILLING

DRILLING METHOD Cable tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0 TO 90
FLUID _____ FROM _____ TO _____

TYPE OF BIT 10" hammer flathead
CASING SIZE (S) USED:
SIZE 10 in FROM 0 TO 90
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE _____
DIAMETER OF PERFORATED SECTION 4 in
PERFORATION TYPE:
SLOTS ~~☒~~ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010
TOTAL PERFORATED AREA 10 ft

RISER PIPE MATERIAL Stainless steel
RISER PIPE DIAMETERS:
O.D. _____ I.D. 4 in
LENGTH OF PIPE SECTIONS 10 ft
JOINING METHOD thread

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0
PROTECTIVE PIPE O.D. 10

OTHER PROTECTION _____

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	-2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM -63	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP ~~63~~	BOTTOM ~~87~~	TOP	BOTTOM
GRAVEL	TOP -63	BOTTOM -87	TOP	BOTTOM
PERFORATED SECTION	TOP -70	BOTTOM 80	TOP	BOTTOM
PIEZOMETER TIP	-82			
BOTTOM OF BOREHOLE	-87			
GWL AFTER INSTALLATION				

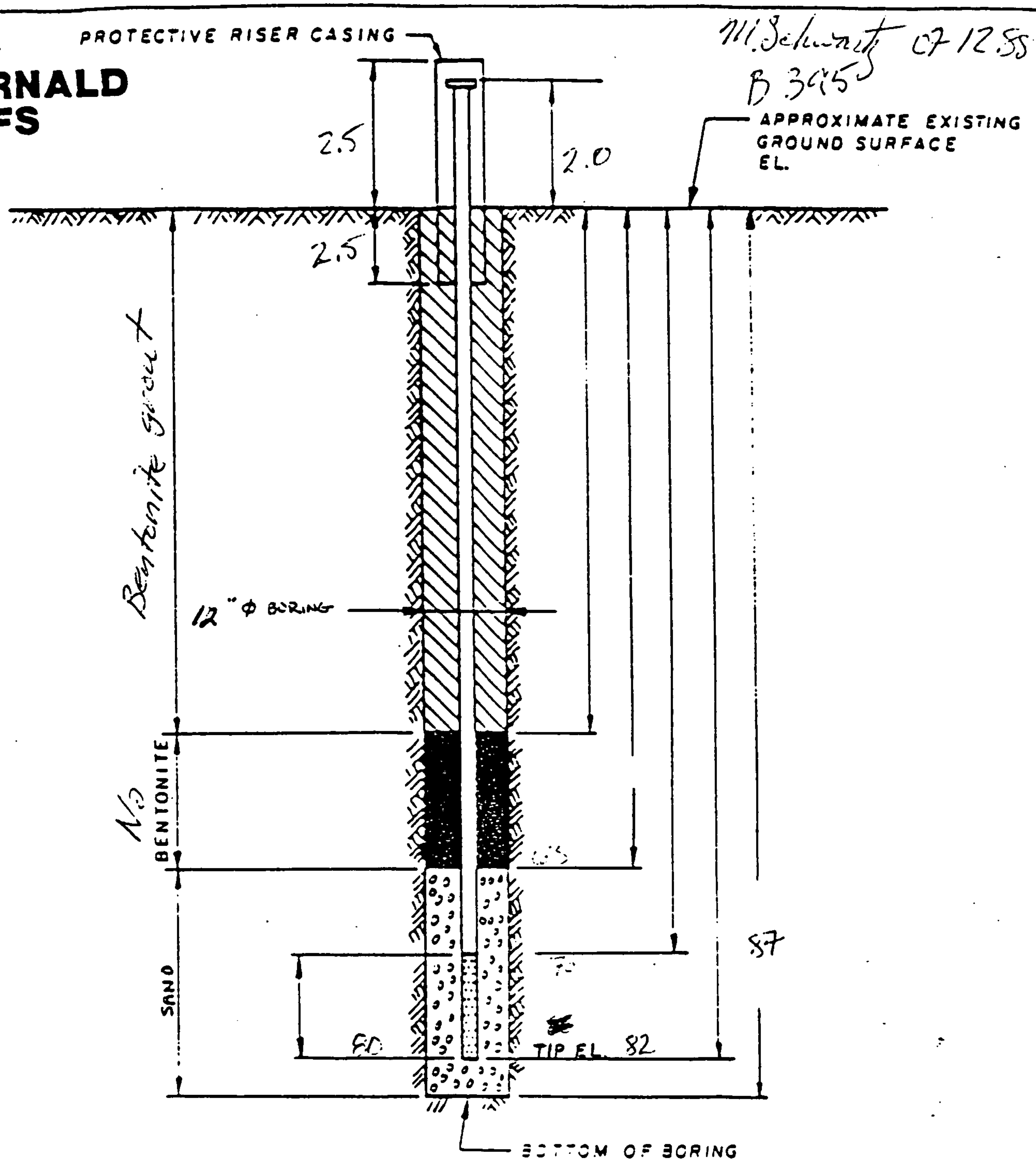
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS _____

16

409-11-86

FERNALD RI/FS



DRAWING NUMBER

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APPROVED BY

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NOTES:

1. RISER PIPE IS 4 IN ID SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 395

PREPARED FOR

2659

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1602.3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 295	COORDINATES:	DATE: 07 13 88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 07 13 88
ENGINEER/GEOLOGIST: SCHWARTZ	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 N/A 1	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1				for soil descriptions			
2				see log for B 395			
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							

NOTES:

water level in B 395 ≈ 15 ft

driller - Harry Dykes
helper - Tim Harris
method - Cable tool
drilling for - Power Drill

Rig Used - speed star
≈ 50 gallons of water used in drilling

18

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1.02.3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: B295	COORDINATES:	DATE: ~~7/13/88~~ 07/14/88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 07/13/88
ENGINEER/GEOLOGIST: SCHWARTZ	Depth Date/Time	DATE COMPLETED: 07/14/88
DRILLING METHODS:		PAGE 2 OF 2

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16				see log for B395			
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30				END OF BORING 30.0 ft			

NOTES:

19

402-11-86

FERNALD
RI/FS

2659

	Initial	Date
1st Key In	JMC	7/28/88
2nd Key In		
Hard Copy Verification		

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. SCHUARTZ DATE 7-14-88
PROJECT NO. 6022.3.2 CHECKED BY _____ DATE _____
BORING NO. B295
PIEZOMETER NO. 295 DATE OF INSTALLATION 7-14-88

BOREHOLE DRILLING

DRILLING METHOD Cable tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0 TO 30
FLUID _____ FROM _____ TO _____

TYPE OF BIT Flathead
CASING SIZE (S) USED:
SIZE 10" FROM 0 TO 30
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE _____
DIAMETER OF PERFORATED SECTION 4"
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010
TOTAL PERFORATED AREA 15 Ft

RISER PIPE MATERIAL stainless
RISER PIPE DIAMETERS:
O.D. _____ I.D. 4"
LENGTH OF PIPE SECTIONS 10'
JOINING METHOD Thread & couple

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH ~~2'~~ 5'
PROTECTIVE PIPE O.D. 16"

OTHER PROTECTION _____

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	-2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP	BOTTOM	TOP	BOTTOM
BENTONITE	TOP 0	BOTTOM ~~-10~~ -5	TOP	BOTTOM
SAND	TOP ~~-5~~ -5	BOTTOM -28	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP -10	BOTTOM -25	TOP	BOTTOM
PIEZOMETER TIP	-27			
BOTTOM OF BOREHOLE	-28			
GWL AFTER INSTALLATION	15			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS boring was completed to 30 ft and collapsed (~~refitted~~) to 28 ft before well construction began

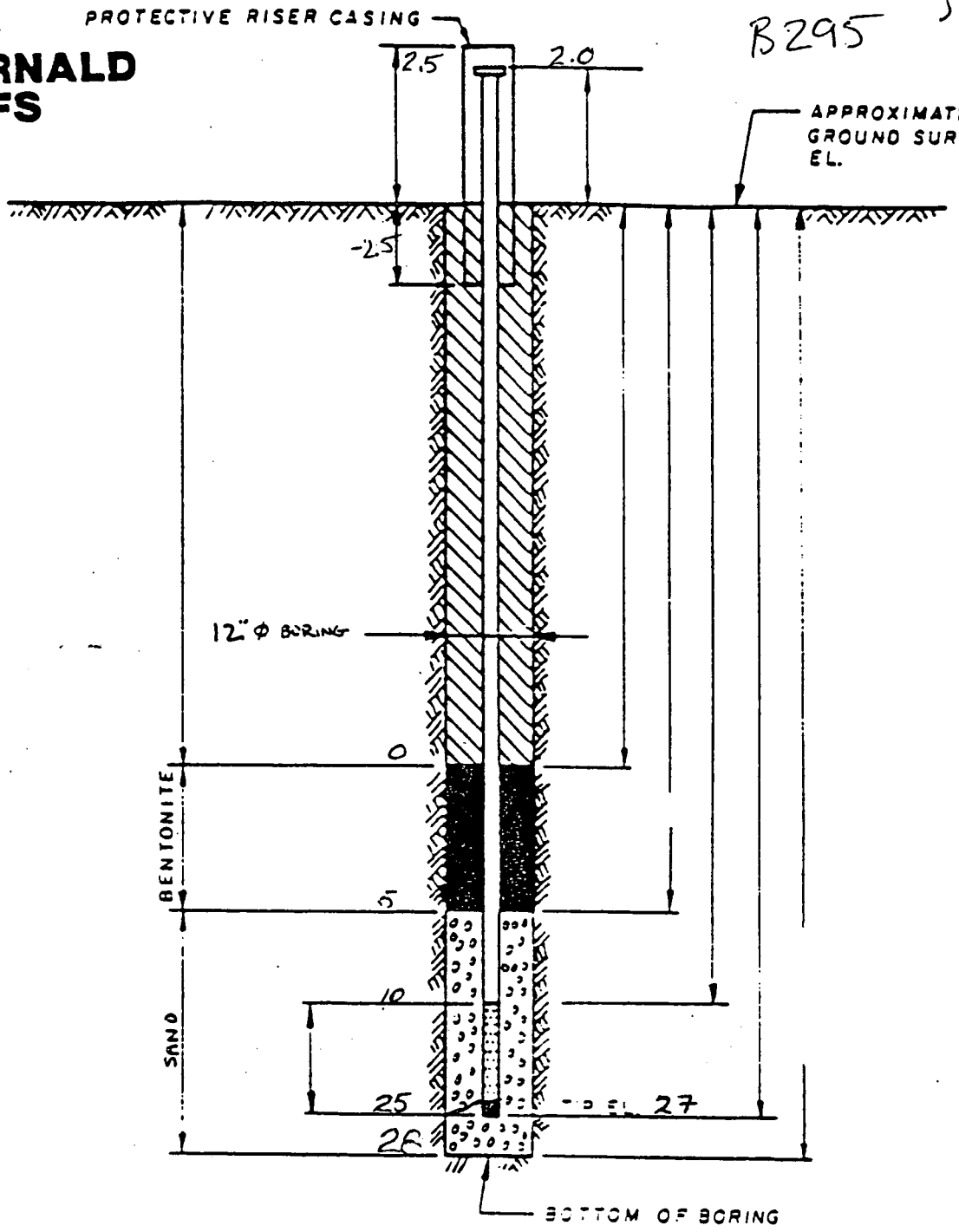
20

409-11-86

2659
M Schwartz C7 14 88

B295

FERNALD RI/FS



DRAWING NUMBER

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DRAWN BY

NOTES:

1. RISER PIPE IS 4 IN I.D SCHEDULE PIPE, THREADED. FLUSH-JOINTED.
2. SCREEN IS 4 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 295

PREPARED FOR

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 32	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: " 496.	COORDINATES:	DATE: 07-26-88
ELEVATION: 580.0 FT	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 (6IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	10175 1053 06-21	2 3 6	12	STIFF YELLOW-BROWN (10YR 6/8) SILTY CLAY, ROOTLETS, DRY	CL	1.5	HNU = 0 α = 0-5 CPM γ = 40-60 CPM ON SURFACE
2 3	10176 1100 06-21	6 10 11	12	HARD YELLOW-BROWN (10YR 5/4) SILTY CLAY, DRY	CL	>4.5	HNU = 0 α = 0-5 CPM γ = 40-50 CPM
4	10177 1107 06-21	10 13 15	12	HARD YELLOW-BROWN (10YR 5/3) SILTY CLAY, TRACE OF FINE GRAVEL, DRY	CL	>4.5	HNU = 0 α = 0-5 CPM γ = 50-60 CPM
5 6	10178 1110 06-21	20 25 30	14	VERY STIFF, YELLOW-BROWN (10YR 5/3) SILTY CLAY, TRACE FINE GRAVEL, TRACE COARSE GRAVEL (>1.0 IN), DRY	CL	2.5	HNU = 0 α = 0-5 CPM γ = 50-60 CPM
7	10179 1117 06-21	23 21 22	18	VERY STIFF, YELLOW-BROWN (10YR 5/3) SILTY CLAY, TRACE FINE GRAVEL, TRACE COARSE GRAVEL (>1.0 IN), DAMP	CL	2.5	HNU = 0 α = 0-5 CPM γ = 40 CPM
8 9	10180 1530 06-21	2 6 10	12	VERY STIFF, MOTTLED YELLOW-BROWN - GREY (10YR 5/4 - 10YR 5/1), SILTY CLAY, TRACE FINE GRAVEL, DAMP	CL	2.5	HNU = 0 α = 0-5 CPM γ = 30-40 CPM
10	10181 1545 06-21	2 8 9	14	VERY STIFF, YELLOW-BROWN (10YR 5/4) SILTY CLAY, TRACE FINE GRAVEL, DAMP	CL	2.5	HNU = 0 α = 0-5 CPM γ = 30 CPM
11 12	10182 1638 06-21	9 13 15	18	VERY STIFF, YELLOW-BROWN (10YR 5/4) SILTY CLAY, TRACE FINE GRAVEL, DAMP	CL	3.0	HNU = 0 α = 0-5 CPM γ = 30-40 CPM
13 14	10183 0831 06-22	3 3 8	12	STIFF, YELLOW-BROWN (10YR 5/4) SILTY CLAY, TRACE FINE GRAVEL, DAMP	CL	1.5	HNU = 0 α = 0-5 CPM γ = 30-40 CPM
14	10184 0850 06-22	2 3 7	12	STIFF, YELLOW-BROWN (10YR 5/4) SILTY CLAY, TRACE FINE GRAVEL, DAMP	CL	1.5	HNU = 0 α = 0-5 CPM γ = 30-40 CPM

NOTES: CONTRACTOR: PENNDRILL
RIG: BUCYRUS-ERIE
DRILLER: DAVE NEUMAN
ASSISTANT: BOB JOHNSON

SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 LEL/O_2 = 0 PPM LEL
α = 0-5 CPM 20.6% O_2
γ = 40-60 CPM

22

WATER ADDED TO HOLE: 1200 GALLONS

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 22	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 496	COORDINATES:	DATE: 07-26-88
ELEVATION: 580.0 FT	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: M. SLUSARCZK	Depth Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CABLE TOOL		PAGE 2 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	10185 0910 06-22	8 9 11	14	STIFF, YELLOW-BROWN (10YR 5/4) — GREY (10YR 5/1) MOTTLED, SILTY CLAY, TRACE FINE GRAVEL, DAMP	CL	1.5	HNU = 0 α = 0-5 CPM β = 30-40 CPM
17	10186 0958 06-22	6 9 12	12		CL	1.5	HNU = 0 α = 0-5 CPM β = 30-40 CPM
18				17.5			
19	10187 1016 06-22	3 8 9	12	VERY STIFF, GREY (5Y 4/1) SILTY CLAY, TRACE FINE GRAVEL, DAMP	CL	2.0	HNU = 0 α = 0-5 CPM β = 20-30 CPM
20 21	10188 1124 06-22	4 6 11	12	STIFF, GREY (5Y 4/1) SILTY CLAY SOME FINE GRAVEL, TRACE SAND, DAMP	CL	1.5	HNU = 0 α = 0-5 CPM β = 20-30 CPM
22	10189 1136 06-22	6 8 11	12	VERY STIFF, GREY (5Y 4/1) SILTY CLAY, SOME FINE GRAVEL, TRACE COARSE GRAVEL (.5 -1.0), DAMP	CL	2.0	HNU = 0 α = 0-5 CPM β = 20-30 CPM
23 24	10190 1345 06-22	9 12 15	12	STIFF, GREY, (5Y 4/1) SILTY CLAY, SOME FINE GRAVEL, TRACE COARSE GRAVEL (.5 -1.0), DAMP	CL	1.5	HNU = 0 α = 0-5 CPM β = 20-30 CPM
25	10191 1404 06-22	10 12 12	12	STIFF, GREY, (5Y 4/1) SILTY CLAY, SOME FINE GRAVEL, TRACE COARSE GRAVEL (.5 -1.0), DAMP	CL	1.5	HNU = 0 α = 0-5 CPM β = 20-30 CPM
26 27	10192 1447 06-22	8 17 21	14	STIFF, GREY, (5Y 4/1) SILTY CLAY, SOME FINE GRAVEL, TRACE COARSE GRAVEL (.5 -1.0), DAMP	CL	1.5	HNU = 0 α = 0-5 CPM β = 20-30 CPM
28	10193 1509 06-22	9 20 17	12	STIFF, GREY (5Y 4/1), FINE SANDY CLAY SOME SILT, SOME FINE GRAVEL, TRACE COARSE GRAVEL (.5 -1.0 IN) DAMP — 28.5	CL	1.5	HNU = 0 α = 0-5 CPM β = 20-30 CPM
				STIFF, GREY (5Y 4/1) SILTY CLAY, SOME FINE GRAVEL, TRACE COARSE GRAVEL (0.5-1.0 IN) DAMP — 29.5			
29	10194 1533 06-22	6 17 40	14	HARD, YELLOW-BROWN (10YR 4/4) SILTY CLAY, SOME FINE TO MEDIUM GRAVEL (0.25-0.50 IN) WOOD FRAGMENTS, DRY — 29.8	CL	1.5	HNU = 0 α = 0-5 CPM β = 20-30 CPM
				DENSE, YELLOW-BROWN (10YR 5/6), FINE-MEDIUM WELL GRADED SAND, SOME SILT, TRACE FINE GRAVEL, DRY	SW	N/A	

NOTES:

* BASE OF TILL @ 29.8 FT

23

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: # 496	COORDINATES:	DATE: 07-26-88
ELEVATION: 580.0 FT	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CABLE TOOL		PAGE 3 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31							
32							
33							
34							
35							
36	10195 C905 06-23	16 53 54	14	VERY DENSE, YELLOW-BROWN (10YR 5/4) POORLY GRADED, FINE SAND, DRY	SP	N/A	HNU = 0 α = 0-5 CPM β = 20-30 CPM
37							
38							
39							
40	10196	11		DENSE, YELLOW-BROWN (10YR 5/4)			HNU = 0
41	0925 06-23	16 21	14	POORLY GRADED, FINE SAND, DRY	SP	N/A	α = 0-5 CPM β = 20-30 CPM
42							
43							
44							

NOTES:

24

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: # 496	COORDINATES:	DATE: 07-26-88
ELEVATION: 580.0 FT	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CASED TOOL		PAGE 4 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	10197 0955 06-23	17 16 17	12	DENSE, YELLOW-BROWN (10YR 5/4) POORLY GRADED FINE SAND, TRACE FINE GRAVEL, DRY	SP	N/A	HNU = 0 α = 0-5 CPM β = 20-30 CPM
47							
48							
49							
50	10198 1054 06-23	5 17 30	12	DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED GRAVELLY SAND, DRY	SW	N/A	HNU = 0 α = 0-5 CPM β = 20-30 CPM
51							
52							
53							
54							
55	10199 1124 06-23	7 17 18	12	DENSE, BROWN-GREY (10YR 5/2) POORLY GRADED FINE SAND, DRY	SP	N/A	HNU = 0 α = 0-5 CPM β = 20-30 CPM
56							
57							
58							
59							

NOTES:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: #496	COORDINATES:	DATE: 07-26-88
ELEVATION: 580.0 FT	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: H. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CABLE TOOL		PAGE 5 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61	10200 0920 07-06	4 8 12	12	MEDIUM DENSE, GREY-BROWN (10YR 4/2) POORLY GRADED, FINE SAND, WET	SP	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
62							
63							
64							
65							
66	10201 0948 07-06	8 17 31	14	DENSE, GREY-BROWN (10YR 4/2) POORLY GRADED, FINE SAND, WET	SP	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
67							
68							
69							
70							
71	10202 0830 07-07	5 8 13	18	MEDIUM DENSE, GREY-BROWN (10YR4/2) POORLY GRADED, FINE SAND, TRACE FINE ~~SAND~~ GRAVEL, WET	SP	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
72							
73							
74							

NOTES:

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: # 496	COORDINATES:	DATE: 07-26-88
ELEVATION: 580.0 FT.	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CABLE TOOL		PAGE 6 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76	10203 0938 07-01	15 21 22	10	DENSE, GREY-BROWN (10YR 4/2) WELL GRADED, GRAVELLY FINE SAND, WET	SW	N/A	HNU = 0 α : 0-5 CPM β : 20-30 CPM
77							
78							
79							
80	10204 1431 07-07	7 10 13	10	MEDIUM DENSE, GREY-BROWN (10YR 4/2) WELL GRADED, GRAVELLY SAND, WET	SW	N/A	HNU = 0 α = 0-5 CPM β = 20-30 CPM
82							
83							
84							
85	10204 1656 07-07	8 9 13	12	MEDIUM DENSE, GREY-BROWN (10YR4/2) WELL GRADED, GRAVELLY SAND, WET	SW	N/A	HNU = 0 α = 0-5 CPM β = 20-30 CPM
87							
88							
89							

NOTES:

27

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6052 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: #496	COORDINATES:	DATE: 07-26-88
ELEVATION: 590.0	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: H. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CABLE TOOL		PAGE 7 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
91	10206 0910 07-09	17 31 42	18	VERY DENSE, GREY-BROWN (10YR4/2) POORLY GRADED SAND, TRACE FINE GRAVEL, WET	SP	N/A	HNU = 0 "BLOW SAND" α = 0-5 CPM β = 20-30 CPM
92							
93							
94							
95							
96	10207 1145 07-09	41 30 35	14	VERY DENSE, GREY-BROWN (10YR4/2) POORLY GRADED FINE SAND, TRACE FINE GRAVEL, WET	SP	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
97							
98							
99							
100							
101	10208 1425 07-09	17 36 50	18	VERY DENSE, GREY-BROWN (10YR4/2) POORLY GRADED FINE SAND, TRACE FINE GRAVEL, WET	SP	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
102							
103							
104							

NOTES:

28

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: #496	COORDINATES:	DATE: 07-26-88
ELEVATION: 580.0 FT.	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CARGE TOOL		PAGE 8 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
106	10209 1554 07-01	28 24 9	18	VERY DENSE, GREY-BROWN (10YR4/2) POORLY GRADED FINE SAND, TRACE FINE GRAVEL, WET 106.3	SP	N/A	HNU = 0 α = 0.5CPM β = 20-30CPM
107				STIFF, GREY (10YR4/1) CLAY, ORGANIC FRAGMENTS, TRACE SILT, DAMP	CL	1.5	
108							
109							
110							
111	10210 0825 07-10	5 17 22	14	VERY STIFF, GREY (10YR4/1) CLAY TRACE SILT, DAMP	CL	3.0	HNU = 0 α = 0.5CPM β = 20-30CPM
112							
113							
114				114.0			
115	10211 1005 07-10	5 14 21	10	DENSE, GREY-BROWN (10YR4/2) POORLY GRADED FINE SAND, WET	SP	N/A	HNU = 0 α = 0.5CPM β = 20-30CPM
116							
117							
118							
119							

NOTES: WATER LEVEL 07-10-88 @ 0812 : 58.6FT

29

402-11-86

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: #496	COORDINATES:	DATE: 07-26-88
ELEVATION: 580.0 FT	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CABLE TOOL		PAGE 9 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
121	10212 1445 07-10	10 21 47	12	DENSE, GREY-BROWN (10YR 4/2) POORLY GRADED FINE SAND, WET	SP	N/A	HNU = 0 α = 0-5 CPM γ = 25-30 CPM
122							
123							
124							
125							
126	10213 1650 07-12	11 19 24	14	DENSE, GREY-BROWN (10YR 4/2) POORLY GRADED FINE SANDS, WET	SP	N/A	HNU = 0 α = 0-5 CPM γ = 25-30 CPM
127							
128							
129							
130	10214 0810 07-13	9 10 14	14	MEDIUM DENSE, GREY-BROWN (10YR 4/2) POORLY GRADED FINE SAND, SOME SILT, WET 131.3	SP	N/A	HNU = 0 α = 0-5 CPM γ = 25-30 CPM
131				STIFF, GREY-BROWN (10YR 4/1) SILTY CLAY, LAMINATED, DK GREY ORGANIC STREAKS, VARVES, DAMP	CL	1.5	
132				BASE OF "BLUE CLAY" 133.6			
133				MEDIUM DENSE, GREY-BROWN (10YR 4/2) POORLY GRADED FINE SAND, TRACE FINE GRAVEL, WET 134.1	SP	N/A	
134				MEDIUM DENSE, YELLOW-BROWN (10YR 4/2) POORLY GRADED FINE SAND, WET 134.5			

NOTES:

SAMPLES WERE COLLECTED AND ARCHIVED FOR FUTURE REFERENCE OVER THE INTERVAL 131.3 FT. TO 134.5 FT. NO SAMPLE NUMBERS WERE ASSIGNED, HOWEVER, THE BORING NUMBER, SAMPLE INTERVAL LOCATION, DATE, AND TIME WERE RECORDED. PHOTOGRAPHS OF THE INTERVAL 133.0 FT TO 134.5 FT. WERE TAKEN.

30

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: #496	COORDINATES:	DATE: 07-26-88
ELEVATION: 580.0 FT.	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: M. SCHRADER	Depth Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CABLE TOOL		PAGE 10 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
136	10215 1350 07-13	9 28 31	18	VERY DENSE, GREY-BROWN (10YR4/2) POORLY GRADED FINE SAND, WET 136.0	SP	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
137				VERY DENSE, YELLOW-BROWN (10YR4/2) POORLY GRADED FINE SAND, WET	SP	N/A	
138							
139							
140							
141	10216 1430 07-13	6 11 23	18	MEDIUM DENSE, GREY-BROWN (10YR4/2) POORLY GRADED SAND, TRACE FINE GRAVEL, WET 141.0	SP	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
142				MEDIUM DENSE, YELLOW-BROWN (10YR4/2) WELL GRADED GRAVELLY SAND, WET	SW	N/A	
143							
144							
145							
146	10217 1625 07-13	15 18 22	10	DENSE, GREY-BROWN (10YR4/2) WELL GRADED GRAVELLY SAND, WET	SW	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
147							
148							
149							

NOTES:

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6027.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: #496	COORDINATES:	DATE: 07-26-88
ELEVATION: 580.0 FT	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: M. SLUSAREK	Depth Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CARLE TOOL		PAGE 11 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
151	10216 1705 07-13	22 21 15	10	DENSE, GREY-BROWN, (10YR 4/2) WELL GRADED GRAVELLY SAND, WET	SW	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
152							
153							
154							
155	10219 0921 07-14	60+/5"	5	VERY DENSE, GREY-BROWN (10YR 4/2) WELL GRADED GRAVEL-SAND-SILT MIXTURE, WET	GM	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
156							
157							
158							
159							
160	10220 1002 07-14	6 8 6	12	MEDIUM DENSE, GREY-BROWN (10 YR 4/2) POORLY GRADED SAND, SOME FINE GRAVEL, WET	SP	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
161							
162							
163							
164							

NOTES:

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: #496	COORDINATES:		DATE: 07-26-88
ELEVATION: 580.0 FT.	GWL: Depth	Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth	Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CABLE TOOL			PAGE 12 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6,12")	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
166	10221 1010 07-19	12 15 13	4	MEDIUM DENSE, GREY-BROWN (10YR 4/2) POORLY GRADED FINE SAND, TRACE FINE GRAVEL, WET	SP	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
167							
168							
169							
170							
171	10222 1052 07-19	6 11 21	14	DENSE, YELLOW-BROWN (10YR 4/3) POORLY GRADED FINE SAND, SOME FINE GRAVEL, WET 171.3	SP	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
172				VERY SOFT, YELLOW-BROWN (10YR 4/3) SILTY CLAY, TRACE SAND, WET	CL	0.25	
173							
174							
175	10223 1414 07-19	9 24 27	16	VERY DENSE, YELLOW-BROWN (10YR 4/3) POORLY GRADED SAND, SOME FINE GRAVEL, WET			HNU = 0 α = 0-5 CPM γ = 20-30 CPM
176							
177							
178							
179							

NOTES:

VISUAL CLASSIFICATION OF SOILS

(602 3.2	PROJECT NAME: FRENCH RIFL	
496	COORDINATES:	DATE: 07-26-89
.0 FT.	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ST: M. SLIWARSKI	Depth Date/Time	DATE COMPLETED: 07-26-88
CABLE TOOL		PAGE 13 OF 14

RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10	VERY DENSE, GREY-BROWN (10YR 4/2) POORLY GRADED SAND, SOME FINE GRAVEL, WET	SP	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
10	DENSE, GREY-BROWN (10YR 4/2) POORLY GRADED SAND, SOME FINE GRAVEL, WET. 186.0	SP	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM
	DENSE, GREY-BROWN (10YR 4/2), SILTY SAND, SAND-SILT MIXTURE, WET	SM	N/A	
4	VERY DENSE, YELLOW-BROWN (2.5 Y 5/4) COARSE GRAVEL (~1.0-1.5 IN) - SAND - SILT MIXTURE, WET	GM	N/A	HNU = 0 α = 0-5 CPM γ = 20-30 CPM

FERNALD RI/FS

2659

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: # 496	COORDINATES:	DATE: 07-26-88
ELEVATION: 580.0 FT.	GWL: Depth Date/Time	DATE STARTED: 06-21-88
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 07-26-88
DRILLING METHODS: CABLE TOOL		PAGE 14 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
196				NO RECOVERY OF SAMPLE FROM INTERVAL 195.5 FT TO 196.5 FT ON 2 ATTEMPTS			
197							
198				BEDROCK PENETRATED @ 198.5 FT			
199	10227 1500 07-21	50+/3	3	U. DEVON, GREY (10 YR 5/1) SHALEY LIMESTONE INTERVAL SAMPLED: 198.5 FT TO 198.8 FT.			HNU: 1.0 α: 0-5 CPM β: 20-30 CPM
200							
201							
202							
203							
204							
205							
206							
207							
208							
209							

NOTES: MATERIALS USED IN WELL COMPLETION/INSTALLATION: 2 - 80LB. SACKS, 4-30 SAND
7 - 100 LB. SACKS 10-20 SAND
VOLCLAY GROUT:

35

2659

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS | FIELD ENG./GEO. M. SLUSARSKI | DATE 07-26-88
PROJECT NO. 602 7.2 | CHECKED BY | DATE
BORING NO. 496
PIEZOMETER NO. 496 | DATE OF INSTALLATION 07-22-88 to 07-26-88

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL | TYPE OF BIT HAMMER
DRILLING FLUID (S) USED: | CASING SIZE (S) USED:
FLUID WATER FROM 0.5 FT TO 198.2 FT. | SIZE 10" ID FROM 0.5 FT. TO 120.0 FT.
FLUID FROM TO | SIZE 8" ID FROM 120.0 FT TO 200.5 FT.

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL | RISER PIPE MATERIAL STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4" I.D. | RISER PIPE DIAMETERS:
PERFORATION TYPE: | O.D. 4 7/8 IN I.D. 4 IN
SLOTS ☐ HOLES ☐ SCREEN ☒ | LENGTH OF PIPE SECTIONS 10 FT, 2 FT.
AVERAGE SIZE OF PERFORATIONS 0.010 IN | JOINING METHOD SCREW TYPE FLUSH
TOTAL PERFORATED AREA 10.0 FT. | JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT | OTHER PROTECTION LOCKING CAP
PROTECTIVE PIPE O.D. 10 3/4 IN.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 FT			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY (VOLCLAY)	TOP 0.0 FT.	BOTTOM 169.0 FT.	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND (10 20)	TOP 169.0 FT.	BOTTOM 190.0 FT.	TOP	BOTTOM
GRAVEL (4-30)	TOP 190.0 FT.	BOTTOM 192.0 FT.	TOP	BOTTOM
PERFORATED SECTION	TOP 178.5 FT.	BOTTOM 188.5 FT.	TOP	BOTTOM
PIEZOMETER TIP	190.2 FT.			
BOTTOM OF BOREHOLE	198.5 FT.			
GWL AFTER INSTALLATION				

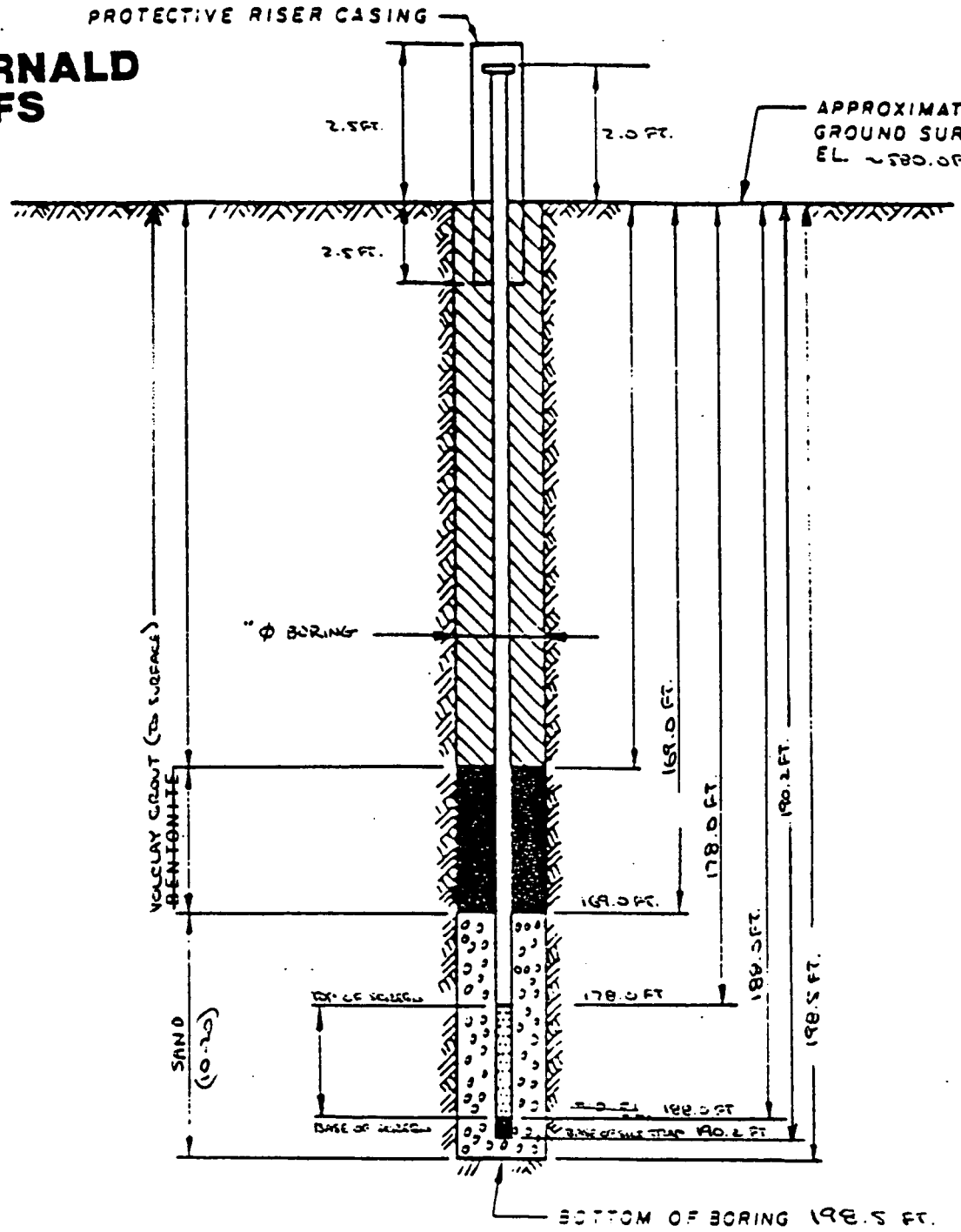
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

36

REMARKS OPEN HOLE SECTION OF BOREHOLE BELOW 192.0 FT WAS ALLOWED TO COLLAPSE ON ITSELF. ONE BUCKET OF BENTONITE PELLETS WERE POURED AROUND THE PROTECTIVE CASING TO SERVE AS PACKING AND SEALING MATERIAL AT THE SURFACE.

BORING #496

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4 IN ID SCHEDULE PIPE, THREADED. FLUSH-JOINTED.
2. SCREEN IS 4 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

MATERIALS USED:

4-30 SAND (80 LB SACKS): 2 SACKS @ BASE OF HOLE TO 190.0 FT.
10-20 SAND (100 LB SACKS): 7 SACKS TO 169.0 FT.
VOLCLAY GROUT (50LB BAGS): 34 BAGS TO SURFACE
BENTONITE PELLETS: 1 BUCKET AS PACKING AND SEALING MATERIAL AROUND PROTECTIVE CASING
WATER ADDED TO HOLE DURING DRILLING: 1200 GALLONS

INSTALLATION DETAILS
MONITORING WELL

PREPARED FOR
BORING #496 07-26-88

DRAWING NUMBER	
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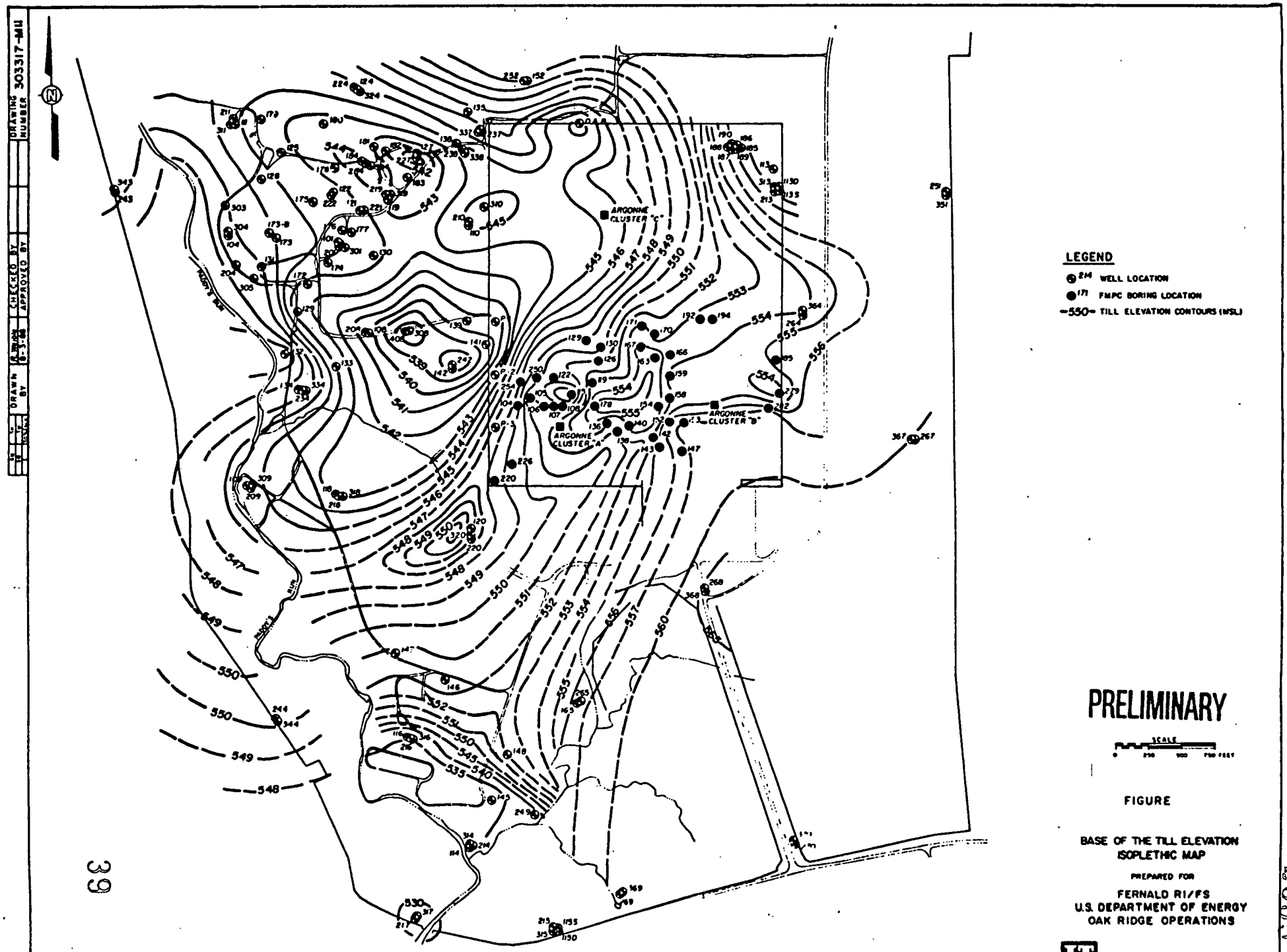
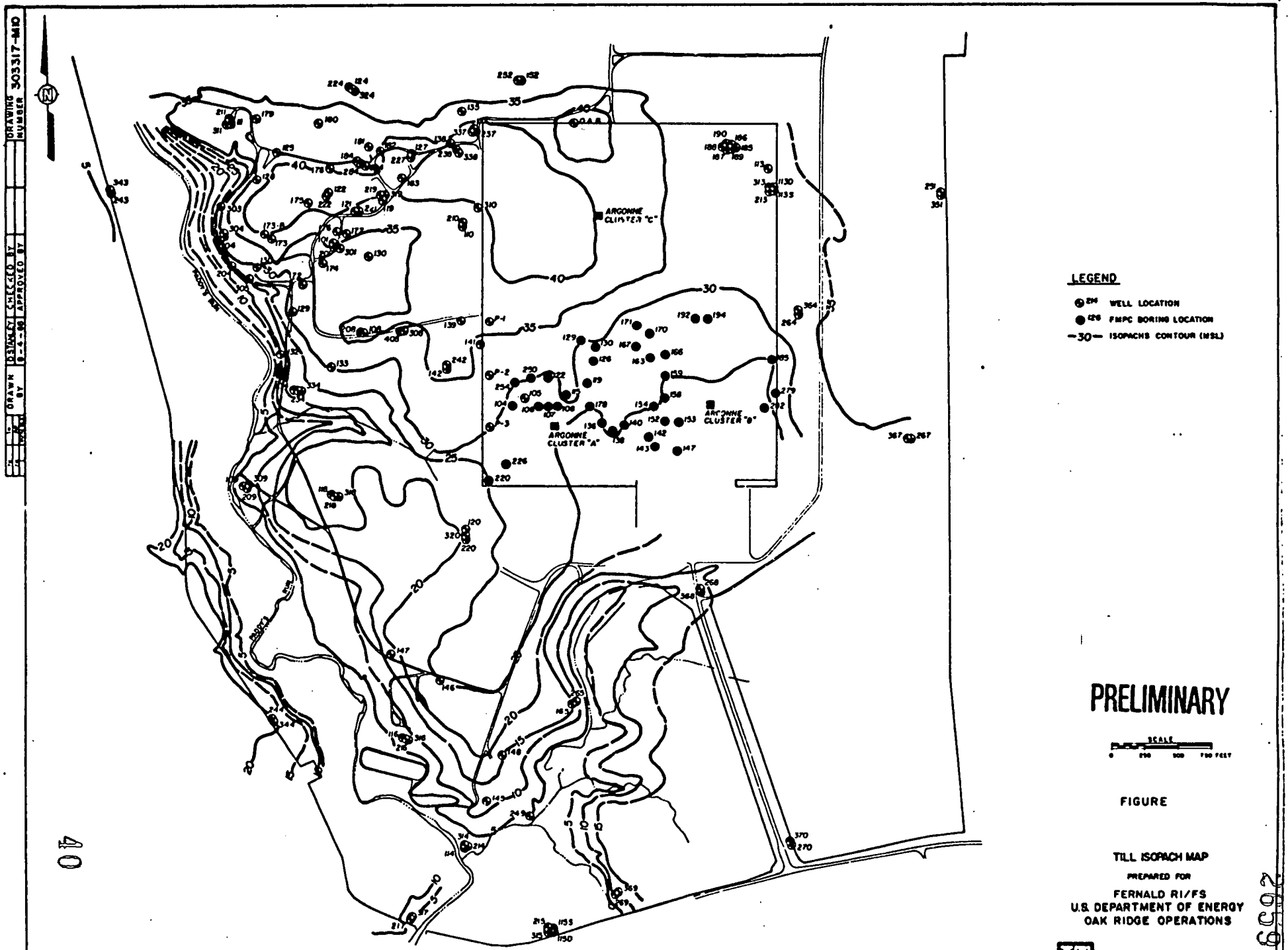
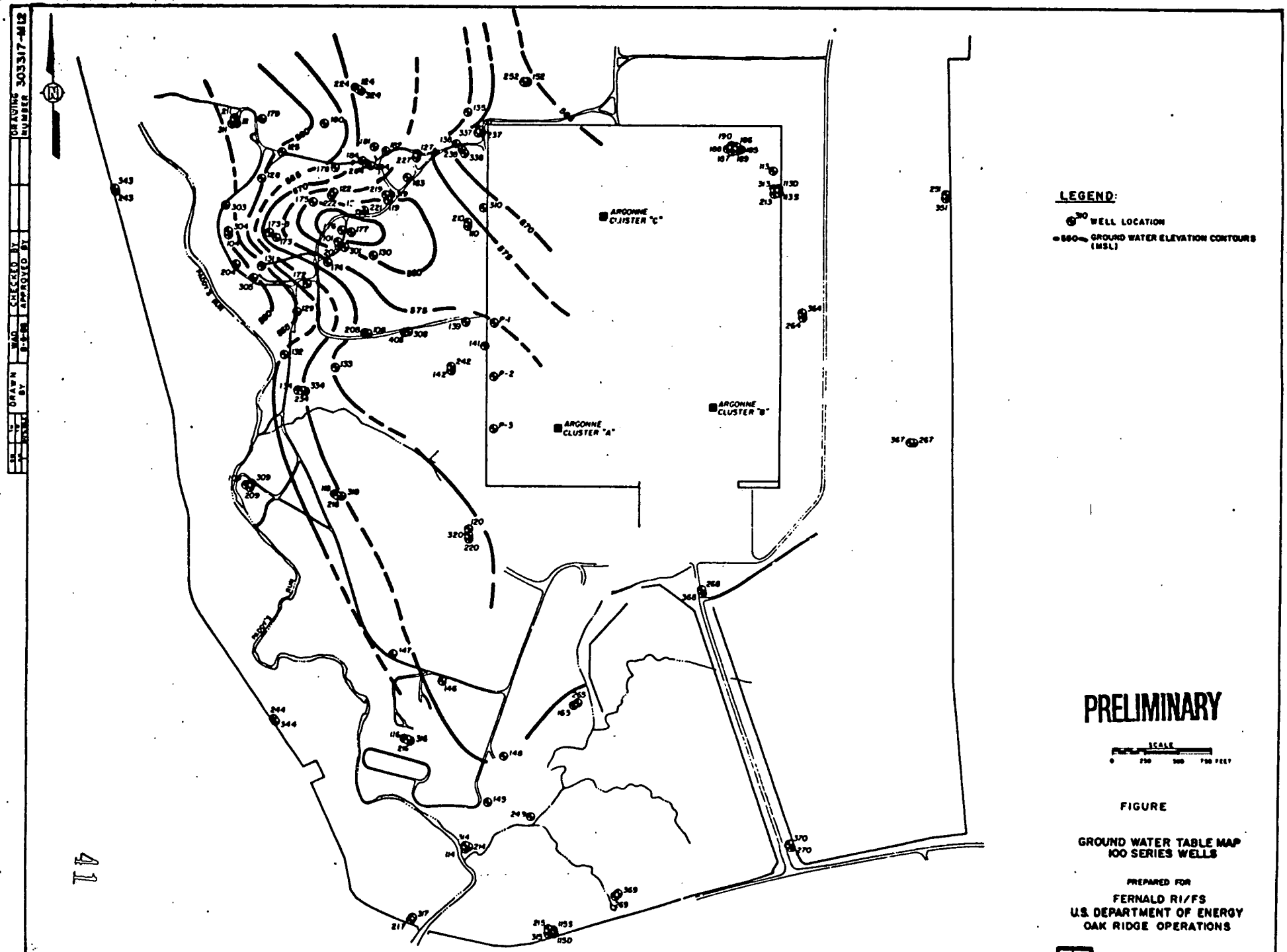
APPROVED BY	
DRAWN BY	

ATTACHMENT II


LEGEND
214 WELL LOCATION
171 FMPC BORING LOCATION
-550- TILL ELEVATION CONTOURS (MSL)
ARGONNE CLUSTER "A"
ARGONNE CLUSTER "B"
ARGONNE CLUSTER "C"
PRELIMINARY
SCALE
0 250 500 1000 FEET
FIGURE
BASE OF THE TILL ELEVATION ISOPLETHIC MAP
PREPARED FOR
FERNALD RI/FS
U.S. DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS
DRAWING NUMBER 303317-M11
DRAWN BY
CHECKED BY
APPROVED BY


DRAWING NUMBER 303317-M10
DRAWN BY
DATE 8-4-90
CHECKED BY
APPROVED BY
ARGONNE CLUSTER "C"
ARGONNE CLUSTER "A"
ARGONNE CLUSTER "B"
O.A.R.
LEGEND
WELL LOCATION
FMPC BORING LOCATION
ISOPACHS CONTOUR (MSL)
PRELIMINARY
SCALE
FIGURE
TILL ISOPACH MAP
PREPARED FOR
FERNALD RI/FS
U.S. DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS


ARGONNE CLUSTER "C"
ARGONNE CLUSTER "A"
ARGONNE CLUSTER "B"
P-1
P-2
P-3
PADDYS RUN
LEGEND:
WELL LOCATION
GROUND WATER ELEVATION CONTOURS (MSL)
PRELIMINARY
SCALE
FIGURE
GROUND WATER TABLE MAP
100 SERIES WELLS
PREPARED FOR
FERNALD RI/FS
U.S. DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS
DRAWING NUMBER 303317-M12
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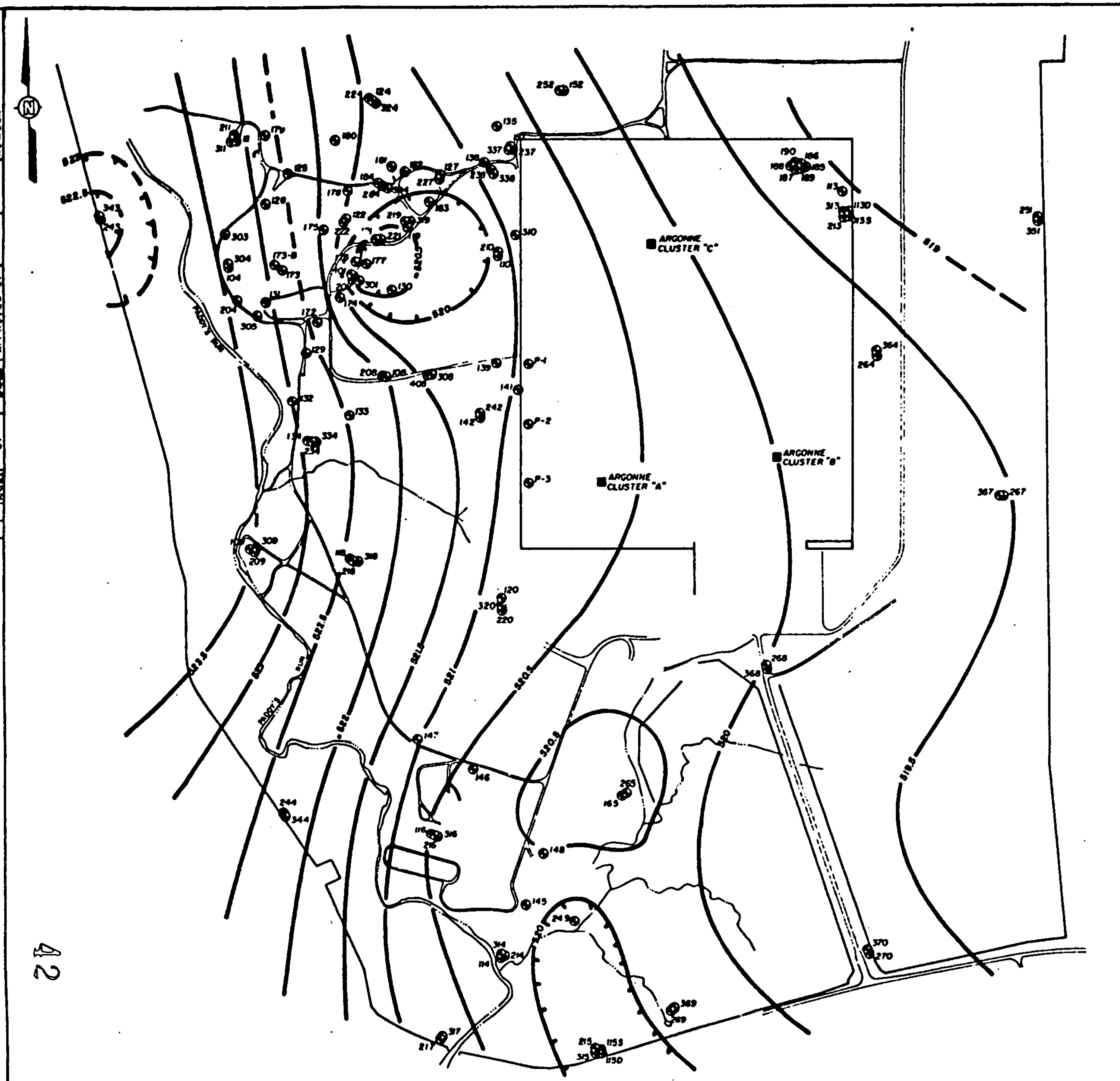

LEGEND:

⊕ WELL LOCATION

—519— GROUND WATER ELEVATION CONTOURS (MSL)

PRELIMINARY

SCALE 0 250 500 750 FEET

FIGURE

GROUND WATER TABLE MAP
200 SERIES WELLS

PREPARED FOR

FERNALD RI/FS
U.S. DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS

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42

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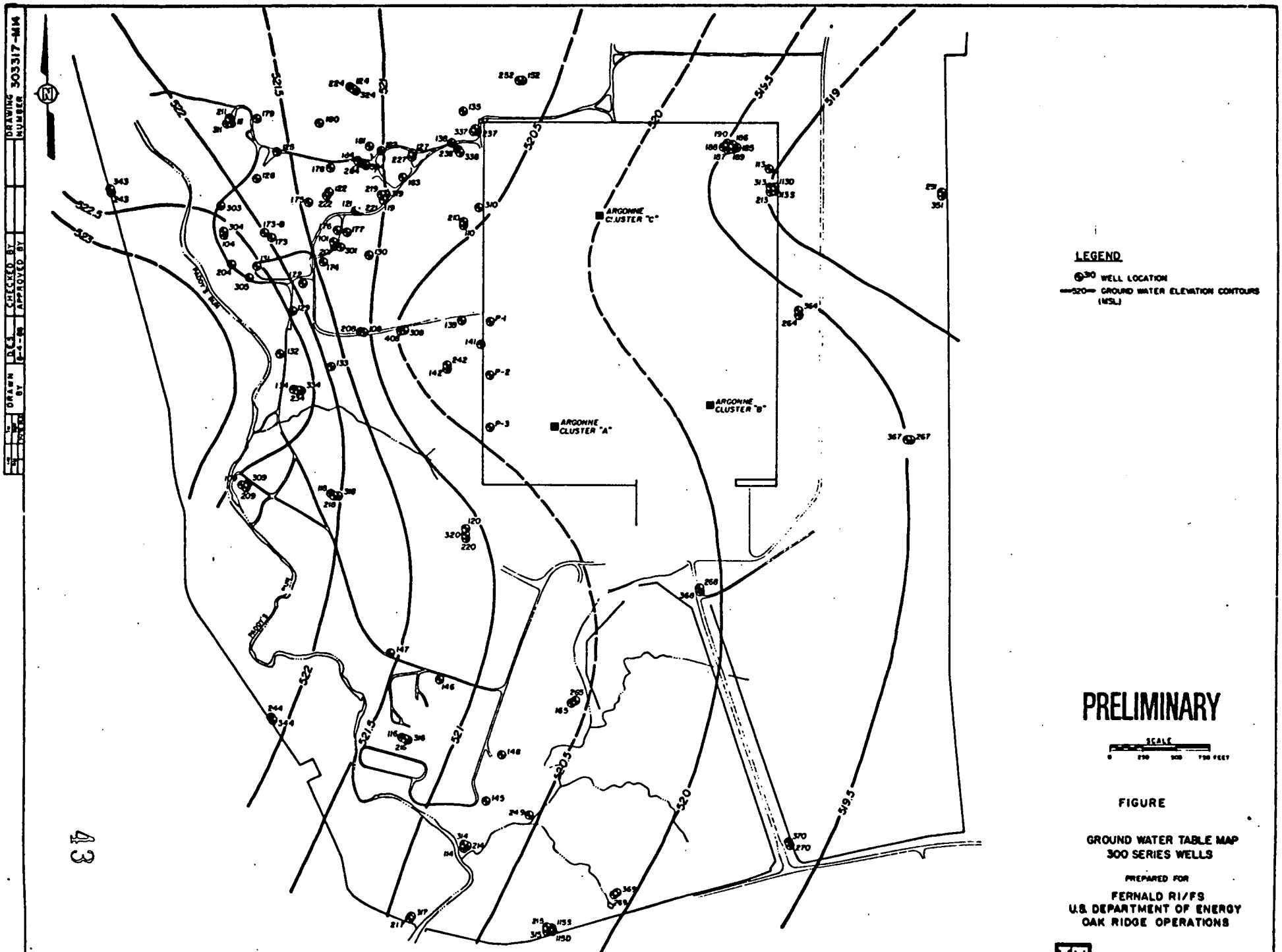
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APPROVED BY
DRAWN BY
D.C.S.
8-4-88
N
522.5
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515.5
515
ARGONNE CLUSTER "A"
ARGONNE CLUSTER "B"
ARGONNE CLUSTER "C"
LEGEND
WELL LOCATION
GROUND WATER ELEVATION CONTOURS (MSL)
PRELIMINARY
SCALE
FIGURE
GROUND WATER TABLE MAP
300 SERIES WELLS
PREPARED FOR
FERNALD RI/FS
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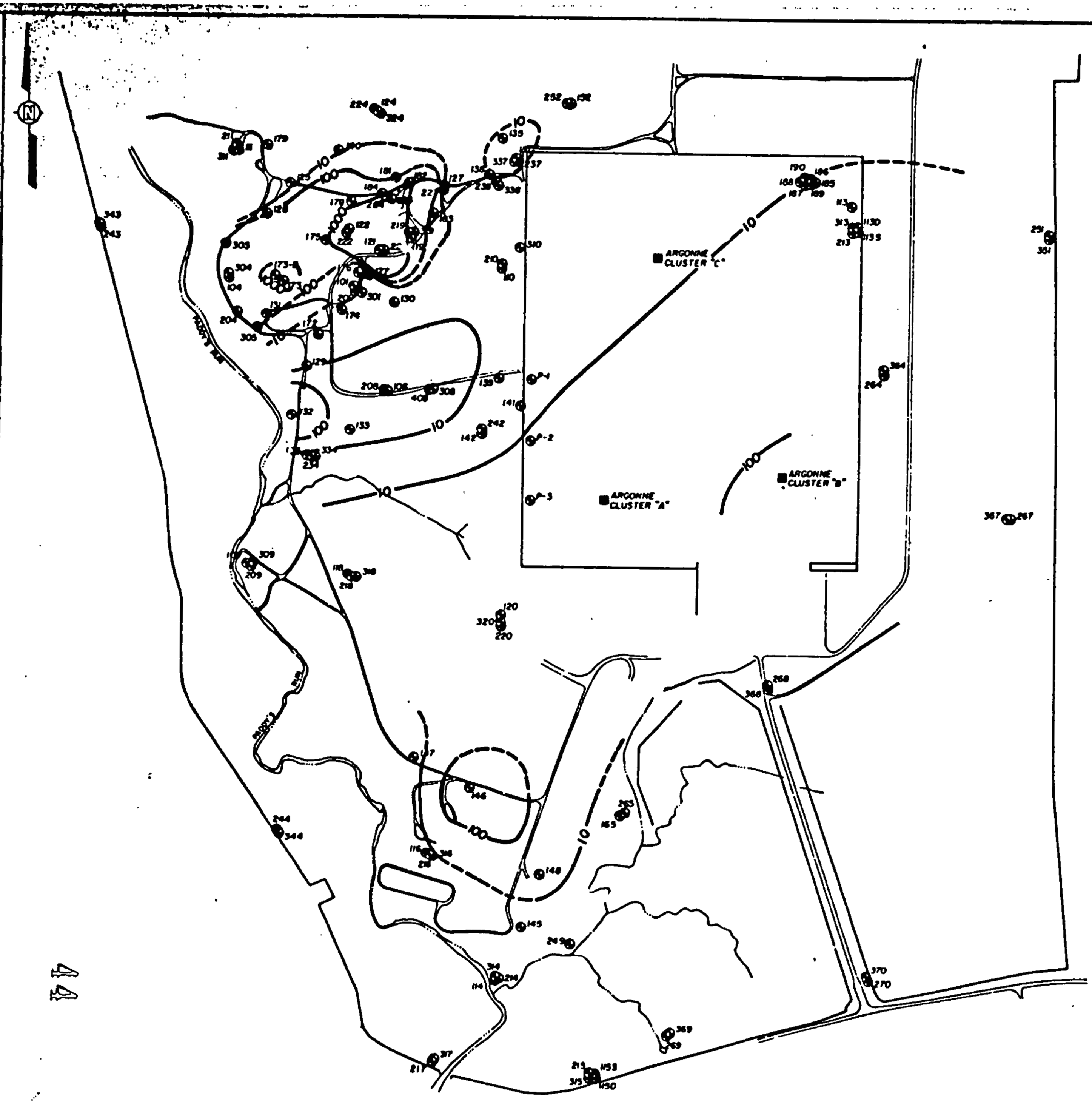
OAK RIDGE OPERATIONS



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LEGEND:

214 WELL LOCATION

—10— URANIUM CONCENTRATIONS (µg/l)

PRELIMINARY

SCALE

0 250 500 750 FEET

FIGURE

TOTAL URANIUM CONCENTRATION IN GROUND WATER (µg/l) SERIES 100, ROUND I

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OAK RIDGE OPERATIONS

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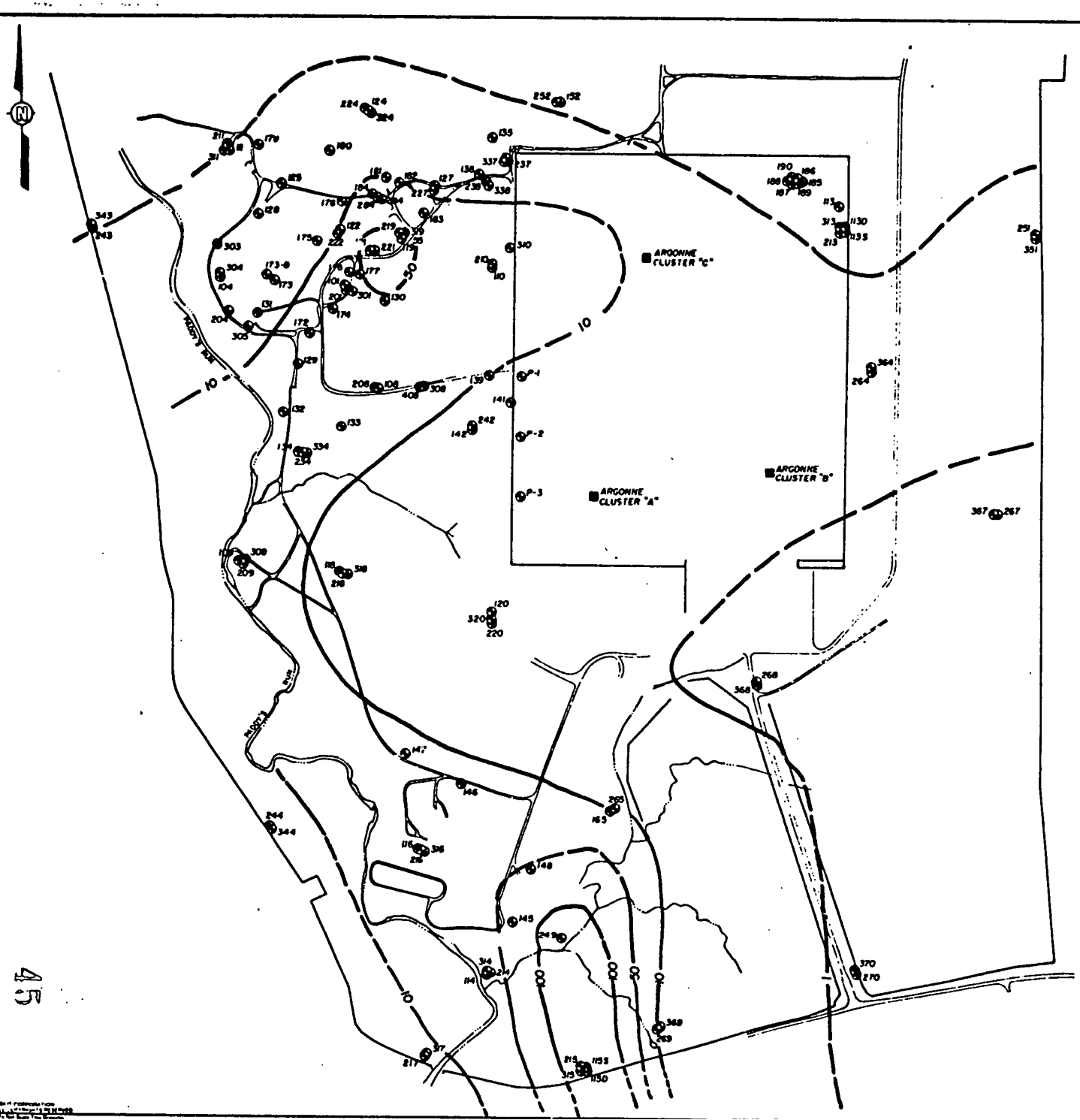

LEGEND

214 ⊕ WELL LOCATION

=50= URANIUM CONCENTRATIONS (μg/l)

PRELIMINARY

SCALE

0 250 500 750 FEET

FIGURE

TOTAL URANIUM CONCENTRATION IN GROUND WATER (μg/l) SERIES 200, ROUND I

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IT ... Creating a Safer Tomorrow

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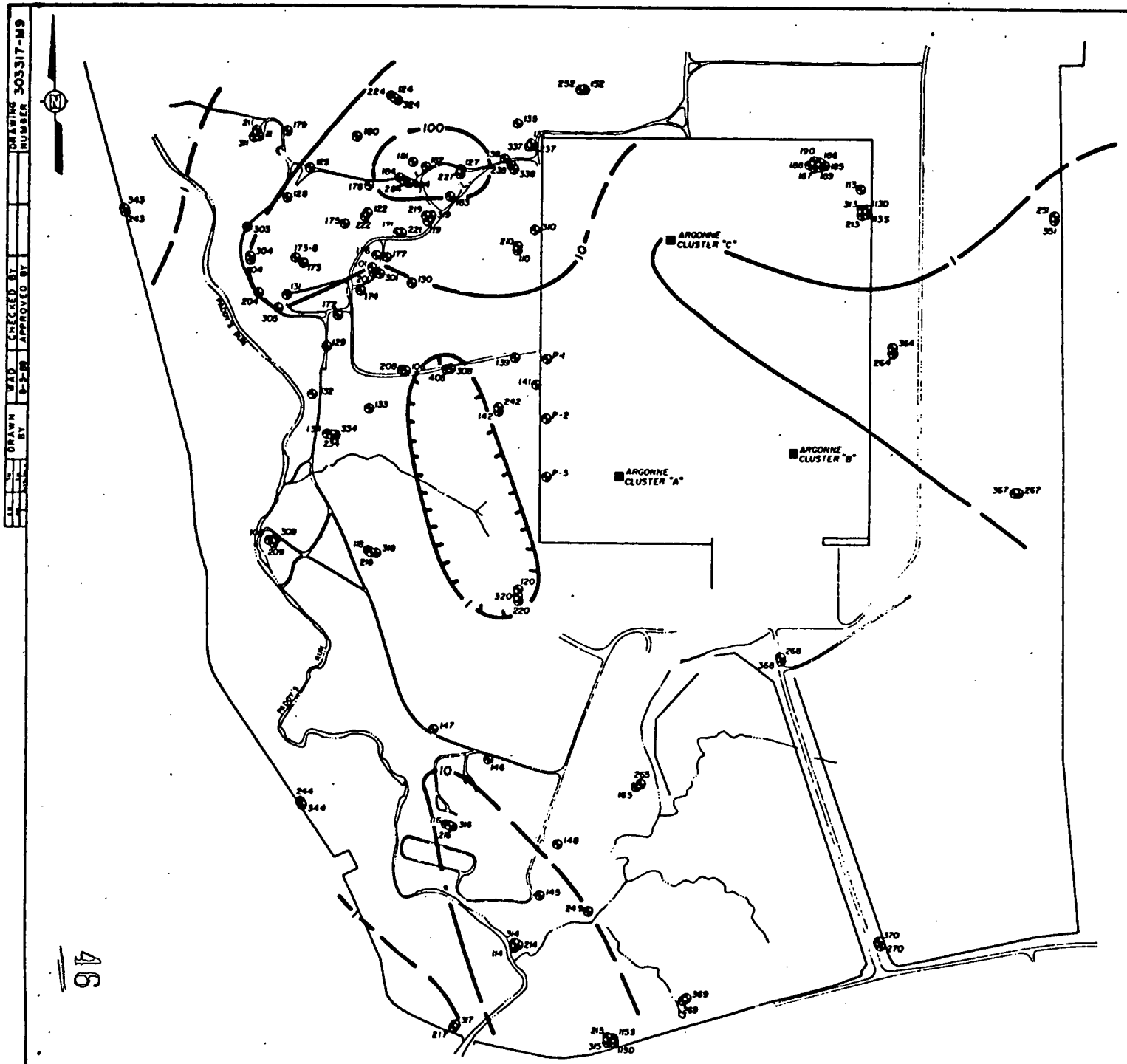
DESIGNED BY | APPROVED BY

45

6992



DRAWING NUMBER 303317-M9

DRAWN BY | WAD 8-2-88 | CHECKED BY | APPROVED BY

FIGURE

TOTAL URANIUM CONCENTRATION IN GROUND WATER (µg/l) SERIES 300, ROUND I

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